Beef Calf Scours: Causes and Prevention

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Objectives

• Reasons for Disease
• Investigating calfhood disease problems
• Treatment
• Prevention
• Sandhills Calving System
Disease Triangle

Agent

Host

Environment
Factors Affecting Calf Health and Performance

- Feed
- $$$
- People
- Environment / Facilities
- Bugs

Calf
Diarrhea

Why did this happen?
Diarrhea in calves:

- K-99 *E. coli*
- Attaching/effacing *E. coli*
- Rotavirus
- Coronavirus
- *Cryptosporidia*
- *Salmonella*
  - *Salmonella Dublin*
  - *Salmonella typhimurium*
  - *Salmonella newport*
  - Other *Salmonella* sp.
- *Clostridium perfringens A*
- Coccidia
Enteritis

- Viral: 706 (42%)
- Bacterial: 686 (40%)
- Protozoal: 309 (18%)
- Mycotic: 1 (0%)
- Infectious unknown: 7 (10%)

The pie chart shows the distribution of Enteritis cases among different types of infections.
Calf Diarrhea Infectious Causes

- **E. coli** – mostly up to 4 days of age (ETEC, K99)
- **Salmonella** – first week (5-14 days?)
- **Rotavirus** – second week
- **Coronavirus** – end of first through second week
Calf Diarrhea Infectious Causes

- Cryptosporidium – usually second week
- Giardia -- ?
- BVD – first month; and any time
- Eimeria spp. – coccidia -- after 3 weeks ...... others?
E. coli diarrhea (Entertoxigenic E coli)

K-99 E. coli: 1 to 5 day old calves
E. coli diarrhea

- Attaching and effacing *E. coli*: usually between 3 and 21 days
Viral and protozoal diarrhea

- Rotavirus and Coronavirus
- Cryptosporidia
- All tend to occur between 5 and 21 days of age often with multiple agents responsible at the same time
Cryptosporidiosis

Crypto organisms
Salmonella diarrhea

- *Salmonella typhimurium* and *S. newport*: Affects mostly 5 to 20 days of age.
- *Salmonella dublin*: most common in 30 to 90 days of age
Clostridium perfringens enteritis
Coccidia

- Severe bloody diarrhea
- Clinical signs three weeks from time of exposure to clinical signs
Coccidiosis
Coccidiosis

Oocyst releasing sporozoites in the intestine

Mature oocyst

Immature oocyst
Before it’s too late...
Dehydration – correct ASAP!

5-6% dehydration: no clinical signs
6-8% - sunken eyes, loss of skin turgor, dry mouth
8-10% - loss of body weight, more distinct sunken eyes, dry mm, increased pulse
10-14% - comatose, cool extremities, poor peripheral pulse
Table 2. Guidelines For Fluid Therapy Of Scouring Calves.

<table>
<thead>
<tr>
<th>% Dehydration</th>
<th>Clinical Signs</th>
<th>Fluid Therapy Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 8%</td>
<td>Slight loss of skin pliability, slightly dry mouth, standing</td>
<td>Oral</td>
</tr>
<tr>
<td>8-10%</td>
<td>Above signs more pronounced, weak, moderately depressed, slightly sunken eyes, mostly lying on chest</td>
<td>Oral &amp; Subcutaneous (consult your veterinarian)</td>
</tr>
<tr>
<td>Greater than 10%</td>
<td>Eyes more sunken, cool extremities, depressed, lying on chest or side</td>
<td>Oral &amp; Subcutaneous (consult your veterinarian)</td>
</tr>
</tbody>
</table>
Investigating Young Calf Diseases

• History of the problem and the herd
• Who What Where When How
• Diagnostic samples
• Coordinating the information
• An eye to prevention
History of problem: Critical to make Dx

- Number of animals affected
- Age
- Diarrhea
- Bloat
- CNS
- Sudden death
- Housing
- Treatments
- Vaccination
• Important to pick right animals for submission
  – Try to send representative animals (those with the signs you are seeing)
• Try to pick animals that have not been treated!!!!!!!!!!!!
• Do not send rotten animals:
  Remember: Garbage in = garbage out
An Eye to Prevention

- Vaccination
- Reduce Exposure
- Nutrition
- Environment
- “Stress”
What Prevents Calves From Getting Scours?

- Decrease exposure (challenge)
- Increase resistance
Decreasing Exposure

- Calving environment
- Biosecurity
Making For Healthy Calves

- Precalving nutrition
- Calving management
  - Cleanliness
  - Dystocia
- Dam immunity
- Colostrum intake
- Exposure
- “Stress”
Table 1. Relationship Between Protein Intake During Pregnancy And “Weak Calf Syndrome” In 14 Herds.

<table>
<thead>
<tr>
<th>Crude protein intake</th>
<th>No. of herds</th>
<th>Average crude protein per cow (lb./day)</th>
<th>Avg. % calves with “weak calf syndrome”</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (more than 2 lb./day)</td>
<td>6</td>
<td>2.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Medium (1.5 to 2 lb./day)</td>
<td>4</td>
<td>1.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Low (less than 1.5 lb./day)</td>
<td>4</td>
<td>1.2</td>
<td>9.8</td>
</tr>
</tbody>
</table>

(Bull, 1974)
Dystocia

- Incidence should be <15% in heifers and <8% in cows
- Dependent on bull choice, BCS of cow, position of the calf
- Dystocia increases stillbirths, neonatal mortality, colostrum deprivation, interferes with IgG absorption, & increases chance for neonatal acidosis
- Dystocia has been associated with calf mortality because of the possibility of uterine fluid inhalation
- Associated with calf mortality up to 30 days of age
Dam Vaccination

Study of 83 beef cows and calves in ND

*Calves from cows vaccinated with ScourGuard 3(K)/C had 59% decrease in scours-related illness compared to calves from non-vaccinated cows.

Among calves that did get sick, duration of illness was longer in calves of non-vaccinated cows than in calves of vaccinates.
The 5 C’s for Healthy Calves

- Colostrum
- Calories
- Cleanliness
- Comfort
- Consistency
Sandhills Calving System
Preventing Calf Scours with the Sandhills Calving System

David R. Smith
Extension Veterinarian
University of Nebraska–Lincoln

http://vetext.unl.edu/stories/200703050.shtml
Nebraska Field Disease Research

Diagnostic investigation
Field epidemiology
Case-studies of interventions
Beef herd experiencing severe losses to calf scours

- 402 cattle with live births, managed as a single group – intensive grazing
- No treatment or control interventions
- 48 deaths due to scours
- An “epidemiologically-pure” scours epidemic
- and RECORDS!
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>R064 98</td>
<td>2</td>
<td>5/13</td>
<td>1</td>
<td>6/12</td>
<td>30</td>
<td>75</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>R444</td>
<td>5</td>
<td>5/15</td>
<td>1</td>
<td></td>
<td>69</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>R145 98</td>
<td>2</td>
<td>5/18</td>
<td>1</td>
<td>5/29</td>
<td>11</td>
<td>65</td>
<td>0</td>
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<tr>
<td>5</td>
<td>R009 98</td>
<td>2</td>
<td>5/25</td>
<td>1</td>
<td>6/10</td>
<td>16</td>
<td>71</td>
<td>1</td>
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<tr>
<td>6</td>
<td>R364</td>
<td>7</td>
<td>5/25</td>
<td>1</td>
<td>6/4</td>
<td>10</td>
<td>78</td>
<td>0</td>
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<tr>
<td>7</td>
<td>R161 98</td>
<td>2</td>
<td>5/27</td>
<td>1</td>
<td>6/3</td>
<td>7</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>R305</td>
<td>4</td>
<td>5/27</td>
<td>1</td>
<td>6/3</td>
<td>7</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>R470</td>
<td>5</td>
<td>5/27</td>
<td>1</td>
<td>6/10</td>
<td>14</td>
<td>77</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>R265</td>
<td>6</td>
<td>5/27</td>
<td>1</td>
<td>6/5</td>
<td>9</td>
<td>93</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>BL008 98</td>
<td>2</td>
<td>5/28</td>
<td>1</td>
<td>6/6</td>
<td>10</td>
<td>64</td>
<td>0</td>
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<tr>
<td>12</td>
<td>R007</td>
<td>6</td>
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<td>1</td>
<td>6/10</td>
<td>13</td>
<td>72</td>
<td>0</td>
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<tr>
<td>13</td>
<td>R208 98</td>
<td>2</td>
<td>5/29</td>
<td>1</td>
<td>6/17</td>
<td>19</td>
<td>95</td>
<td>1</td>
</tr>
</tbody>
</table>
Frequency of births and deaths by week

Count

Date


- date of birth
- deaths
Factors of the calf explaining death from scours

![Bar chart showing the probability of death for different ages of dams. The chart indicates a higher probability of death for dams aged 2 years compared to those aged 3 years and 4 years or more.](image-url)
Factors of the calf explaining death from scours

- Calves born on the day of a pasture-move were more likely to die (OR=1.9, p=0.09)
Age specificity of calf scours

- Population at-risk for scours: calves 1-3 weeks of age

Also at-risk for shedding scours agents

Frequency histogram of age of calves at death

<table>
<thead>
<tr>
<th>Age at death (days)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-9</td>
<td>5</td>
</tr>
<tr>
<td>10-14</td>
<td>20</td>
</tr>
<tr>
<td>15-19</td>
<td>25</td>
</tr>
<tr>
<td>20-24</td>
<td>10</td>
</tr>
<tr>
<td>25-29</td>
<td>5</td>
</tr>
<tr>
<td>More than 26</td>
<td>5</td>
</tr>
</tbody>
</table>
Age of death over time

Death in the same age-range throughout the calving season
• Levels of pathogen exposure increase over **TIME within a calving season**

  – Because of
    • **Increasing ANIMAL DENSITY** (crowding and rapid environmental contamination)
    • **MULTIPLIER EFFECT**
      – Cows - “low” level of shedding
      – Calves – multiply pathogens to higher and higher levels
Multiplier Effect
Sandhills Calf Scours Project

• Re-create the conditions at the start of the calving season
  – Move pregnant cows to new calving pastures each week to minimize dose-load and contact time
  – Segregate calves by age to prevent the multiplier effect
Sandhills Calving System
Week 1&2

Calving Pasture
Sandhills Calving System
Week 3

1-2 week old Pairs
Calving Pasture
Sandhills Calving System

Week 4

2-3 week old pairs

1 week old pairs

Calving Pasture
Sandhills Calving System
Week 5

2 week old pairs
1 week old pairs
Calving Pasture
Sandhills Calving System

Week 6

Calving Pasture

1 week old pairs

2 week old pairs
## Sandhills Calving System
### Week 9

<table>
<thead>
<tr>
<th>Calving Pasture - Finish out</th>
<th>1 week old pairs</th>
<th>2 week old pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Groups commingled after youngest calf is 4 weeks of age</td>
<td></td>
</tr>
</tbody>
</table>
Develop a plan
Case Herd 1

- 800-900 March-calving cows
  - paired out from calving lot
- Mortality due to scours
  - 14% 1995
  - 6.5% 1996
  - 8.2% 1999 (similar losses in ‘97 and ‘98)
- Treatment expenses $3114 /yr (‘95-’99)

55-120 dead calves every year attributed to scours
Case Herd 1

- **Sandhills Calving System**
  - in ’00, ’01, ’02, ’03, ’04
- **Greatly reduced morbidity and mortality**
  - 4 calves treated for scours (2000)
  - NO calves treated for scours since
  - NO deaths due to neonatal calf diarrhea (p<0.01)
- **24-fold reduction in animal health expenses** ($128.83 /yr, p<0.01)
Case Herd 2

- 300-400 Summer calving cows
- Intensive grass management
  - cattle move through pastures every 2-3 days
- Mortality (1° due to scours)
  - 6.5% in 1999
  - 11.9% in 2000

Summer calving and rotating calving pastures did not prevent calf scours!
Case Herd 2

- **Sandhills Calving System** in ’01, ’02, ’03, ’04
- Modified for intensive grass management
  - Split off groups every 100 pairs or 10 days
  - multiple groups moving through different pastures
- “all causes” death loss significantly reduced
  - 1 death from neonatal scours in 4 years
Death and illness due to neonatal scours prevented
  - More calves weaned
  - Greater performance

Minimal to no treatment or antibiotic use

Less labor!
Sandhills Calving System

- Prevent Effective Contacts to Control Calf Scours
  - Move “Heavy” Cows to Clean Calving Pastures
  - Segregate Calves by Age
  - Make Each Week of the Calving Season as Good as the First
Image Contributors

- Dr. Moeller
- Dr. Adaska
- Dr. Blanchard
- Dr. Reynolds
- Dr. King
- Dr. Galvao
- CAHFS
- VMTRC
- UC Davis
- WSU
- Various producers and veterinarians
- USDA:ARS
- *University of Nebraska